SYLLABUS

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty[1]/ Department [2]	Chemical Engineering, Biotechnologies and Environmental Protection / CAICAM
1.3 Field of study (name/code[3])	Chemical Engineering / 10.30.50
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	Chemical Engineering / 10.30.50.60 / engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[4]			General chemistry I / DF				
2.2 Coordinator (holder) of course activities			Assist.dr.eng. Delia-Andrada Duca				
2.3 Coordinator (holder) of applied activities[5]			Assist.dr.eng. Delia-Andrada Duca				
2.4 Year of study[6]	I	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [8]

3.1 Number of fully assisted hours / week	5 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	1/2/0
3.1* Total number of fully assisted hours / semester	70 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	14/28/0
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	3.93 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			0.93
		hours of individual study after manual, course support, bibliography and notes			1.5
		training seminars / laboratories, homework and papers, portfolios and essays			1.5
3.7* Number of hours of unassisted activities / semester	55 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			13
		hours of individual study after manual, course support, bibliography and notes			21
		training seminars / laboratories, homework and papers, portfolios and essays			21
3.8 Total hours / week [9]	8.93				
3.8* Total hours /semester	125				
3.9 Number of credits	5				

4. **Prerequisites** (where applicable)

4.1 Curriculum	•

[1] The name of the faculty which manages the educational curriculum to which the discipline belongs
[2] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[3] The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.
[4] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[5] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] Year of studies in which the discipline is provided in the curriculum.
[7] Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).
[8] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[9] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Medium-sized classroom, support materials: laptop, projector, whiteboard. • Students are not allowed to attend the course, seminars/laboratories with their mobile phones turned on. Additionally, phone calls will not be tolerated during the course, nor will students be allowed to leave the classroom to take personal calls. • Tardiness to the course, seminars, and laboratories will not be tolerated.
5.2 to conduct practical activities	• Laboratory with appropriate equipment, computer, whiteboard. • The deadline for submitting the seminar work is set by the instructor in agreement with the students. Requests for extensions will not be accepted unless justified by valid reasons. Additionally, for late submission of seminar/laboratory work, the work will be penalized with 1 point per day of delay.

6. Specific competencies acquired through this discipline

Specific competencies	• Identification and use of the appropriate method for analyzing inorganic products. Performing control of inorganic compounds using chemical analysis techniques.
Professional competencies ascribed to the specific competencies	• - Analyse production processes for improvement; • - Manage chemical testing procedures; • - Test materials; • - Write technical reports • -Performs chemical experiments • -Approve engineering design • -Assess environmental impact .
Transversal competencies ascribed to the specific competencies	• - Conduct quality control; • - Apply scientific, technological and engineering knowledge; • - Uses equipment, instruments or technological equipment accurately

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Mastery of general chemistry concepts, development of problem-solving skills in general chemistry, and acquisition of skills for handling tools in the chemistry laboratory.
7.2 Specific objectives	• Defining basic notions, concepts, theories, and models from the fundamental field of engineering sciences and their appropriate use in professional communication. • Using basic knowledge from fundamental sciences to explain and interpret engineering phenomena. • Identifying and applying concepts, methods, and theories to solve engineering problems with qualified assistance. • Critically analyzing and using principles, methods, and techniques to evaluate processes both quantitatively and qualitatively. • Theoretical foundation for solving specific problems in the field using established principles and methods.

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. **Introduction**: Matter-substance and energy, Object of chemistry, Brief history, Scientific observation in chemistry, measurements, International System of Units (SI	2	Presentation and discussion, active participation to discussions, demonstration, problem-solving, electronic resources available at cv.upt.ro
2. **Atomic and molecular structure of substances**: Generalities, Classical laws of chemistry, Rutherford's experiment, atomic models, elementary particles, atomic number, mass number	4	
3. **Electronic structure of atoms**: Electron shells, orbitals, filling of electron shells, periodic system of elements	4	
4. **Chemical bonds**: Ionic, covalent, metallic bonds, weak bonds	3	
5. **Gas laws**: Isothermal, isobaric, isochoric transformations, General equation of state of ideal gases	2	
6. **Solid state**: Crystalline state, Amorphous state	3	
7. **Solutions**: Solution concentration, Thermal effects of dissolving substances and dilution, Henry's law, Raoult's law, Ebullioscopy, Cryoscopy, Osmosis	4	
8. **Chemical reactions**: Chemical reaction equations, Stoichiometry, Chemical equilibrium, Chemical kinetics, Yield, Conversion	2	
9. **Equilibria in aqueous electrolyte solutions**: Electrolytic dissociation, degree of dissociation, classification of electrolytes, Equilibria in electrolyte solutions, activity, pH	4	

Bibliography [12] 1. M. Niculescu, R. Dumitru (Vodă), Reactii ale substanţelor anorganice. Principii şi aplicaţii, Editura Politehnica, Timişoara, 2008.
2. S. S. Zumdahl, Basic Chemistry, Third Edition, Editura Heath, Lexinghton, Masschusetts, Toronto, 1996.
3. L. Pauling, Chimie Generala, Editura Stiintifica, Bucuresti, 1972.
4. C. D. Nenitescu, Chimie Generală, Editura Didactică şi Pedagogică, Bucureşti, 1985.

8.2 Applied activities [13]	Number of hours	Teaching methods
Seminar	14	Numerical applications, explanations, suggestions for individual study topics.
1. Scientific observation in chemistry, measurements, International System of Units	1	
2. Atomic number, mass number, elements, isotopes, empirical and molecular formulas, numerical applications	1	
3. Electronic structure of atoms, applications	2	
4. Periodic system and periodic law	1	
5. Chemical bonds, applications	1	
6. Solutions - numerical applications	2	
7. Chemical reactions	1	
8. Stoichiometry, applications	1	
9. Chemical yield, conversion, applications	1	
10. Equilibria in electrolyte solutions, applications	2	
11. Nomenclature in chemistry	1	
Laboratory	28	Discussion of theoretical aspects of the experiments, conversations, examples, explanations,
1. Safety regulations and occupational protection in chemistry laboratories	2	
2. Tools used in the chemistry laboratory	2	
3. Laboratory operations: measuring volumes, masses, precipitation,	4	

[10] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[11] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).
[12] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[13] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

filtration 4. Determination of the formula of a crystallohydrate 5. Dissolution of substances and preparation of solutions 6. Types of chemical reactions, demonstrating chemical reactions 7. Acid-base reactions: Estimating the pH of distilled water and protolyte solutions 8. Redox reactions: $M_1^{n1+}{}_{(aq)} + M_{2\,(s)} \longrightarrow M_{1(s)} + M_2^{n2+}{}_{(aq)}$ ($n\oplus$; $n'\oplus(<n\oplus)$) 9. Redox reactions: $M^{(aq)}$ + E^- (halide)→ $M^{(aq)}$ + E2. Existence of halides ME_n under standard conditions 10. Reaction of MnO_4^- with $H_2C_2O_4$ in acidic medium 11. Reaction of NO_3^- with $Al_{(s)}$ in basic medium	1 6 3 4 2 1 2 1	experimental determinations; data processing; interpretation of results. Work in groups of 2-3 students.
Bibliography [14] Bibliografie 1. M. Niculescu, Raluca Dumitru (Vodă), Reacţii ale substanţelor anorganice. Principii şi aplicaţii, Editura Politehnica, Timişoara, 2008.		

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- The content of the discipline – General Chemistry, is aligned with similar courses both nationally and internationally, as well as with the expectations of professional associations and key employers in the field.
- The content of the discipline was developed considering the needs and expectations of employers in the field. These were identified through discussions held within the specialization's Board, which includes representatives from the economic sector.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Knowledge of basic concepts in the field of general chemistry. Ability to practically apply the concepts taught in the course.	Written exam: 3 hours, consisting of 2 theoretical questions and 6 applications.	1/2
10.5 Applied activities	**S:** Practical applications in the form of problems aimed at deepening the theoretical concepts taught.	Assessment of students based on problems to conclude ongoing activities.	1/4
	L: Degree of involvement in carrying out assignments, interpretation of results, and presentation of reports. Seriousness and punctuality	Discussions with students, evaluation of laboratory reports. Grading the approach to solving the problems assigned as homework.	1/4
	P[16]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [17])			
• Students are considered to have met the minimum knowledge requirements if they master the fundamental concepts of general chemistry and score at least 5 in all laboratory work, seminar and exam.			

Date of completion **Course coordinator** **Coordinator of applied activities**

[14] At least one title must belong to the discipline team.
[15] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)
[16] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.
[17] It will not explain how the promotion mark is awarded.

	(signature)	**(signature)**
10.10.2024	Assist.dr.eng. Delia-Andrada Duca	Assist.dr.eng. Delia-Andrada Duca
Head of Department (signature)	**Date of approval in the Faculty Council** [18]	**Dean (signature)**
Assist.prof. dr.eng. Andrea KELLENBERGER		Ș.L.dr.ing. Mircea Laurențiu DAN

[18] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.